

Neurological disorders and nutrition

➤ General considerations, e.g., dysphagia

➤ Main topics and optional Canadian websites:

• **STROKES**

- www.heartandstroke.ca

• **EPILEPSY**

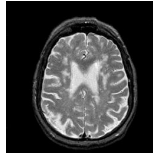
- www.epilepsy.ca

• **PARKINSON'S**

- www.parkinson.ca

• **ALZHEIMER'S**

- www.alzheimer.ca



• **Nutritional causes: overnutrition or undernutrition**

- chronic low intake of nutrients

• examples: *vitamins, energy-yielding nutrients, minerals*

- Wernicke-Korsakoff Syndrome...

- Pernicious Anemia

- Peripheral neuropathy

- Mental retardation



- chronic excessive intake of nutrients and non-nutrients

• examples: *vitamins, fats, alcohol and other toxins*

- Strokes

- Peripheral neuropathy...

- Konzo & Lathyrism...neurotoxic phytochemicals



- malabsorption or defective transport

• examples: *fat malabsorption, vitamin-binding protein deficiency*

- Vitamin E deficiency syndrome...



• **Non-nutritional causes: nutritional implications...**

Nutritional and related assessments

• Some general considerations:



• include comparing past and present *rates of chewing, extent of dysphagia*, as well as more typical nutrient intakes....getting worse, better, or stable?

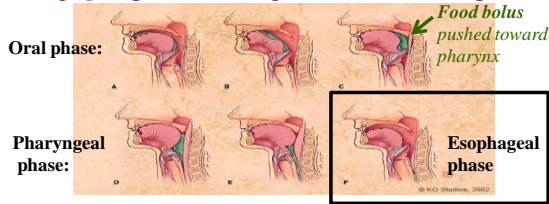
• frequent assessments important especially with neurodegenerative diseases

• consider also related *cognitive function, physical ability to self-feed* (prepare food and bring it to the mouth)....may require enteral nutrition until self-feeding resumes, e.g., in stroke, unlikely in neurodegenerative diseases such as Alzheimer's and Parkinson's

• has there been unwanted weight loss of 10% or more? This could be sign of malnutrition or other problem....



Dysphagia: difficulty with swallowing

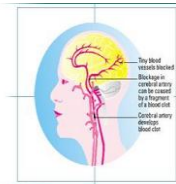


- **Potential problems and solutions**
 - inadequate nutrient intake
 - choking
 - lung infections (aspiration pneumonia)
 - mash or liquefy solids
 - thicken liquids
 - micronutrient supplementation
 - enteral nutrition

Strokes

Some statistics from Canadian HS Foundation
 ~50,000 strokes in Canada each year
 ~300,000 Canadians living with effects of stroke (~1 in 5 chance of having another stroke within ~2 years)
 ~every 10 years, risk of stroke doubles for those aged over 55

- ~85% thromboembolic (atherosclerosis/thrombosis)
 - embolic: plaque travels to brain and blocks vessel
 - thrombotic: local plaque blocks vessel with clot
- ~15% intracranial hemorrhage
 - ruptured blood vessel



Stroke prevention



- Control
 - hypertension, obesity, diabetes, atherosclerosis...
 - non-nutritional factors: *smoking, lack of exercise*
- Strokes in children usually have other causes, e.g., head trauma, infections, inherited blood clotting disorders...drug/alcohol abuse in teens

Nutritional management of post-stroke patient

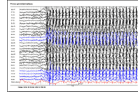
- Decreased cholesterol, fat, and salt is NOT an immediate priority
- Major task:
 - implement a well-balanced diet to aid recovery
 - manage dysphagia and physical problems
 - enteral nutrition may be needed to avoid deficiencies

Epilepsy

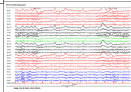
Some statistics from Canadian epilepsy association:

- 15,000 people diagnosed with epilepsy each year (over half are diagnosed before age of 9, and over 80% by 18)
- 1 in every 200 Canadians has epilepsy (mostly youth; in about half of all cases of childhood epilepsy, seizures disappear by adulthood)

• Different types...



• Excessive neural activity (generalized or focal) that leads to seizures



Drug-nutrient interactions in epilepsy

• Anticonvulsants

- may influence hepatic vitamin D metabolism ...hypovitaminosis D
- folic acid can influence anticonvulsant drug metabolism...



Nutritional management of epilepsy

- Ketogenic diet
 - when drug therapy is not very effective
 - create and maintain state of ketosis
 - strict adherence to diet required...can be difficult
 - if effective, medication may be reduced
 - helps some...~1 in 3



Implementation of ketogenic diet

- period of fasting may be involved
- followed by ~4:1 ratio of [fat]:[protein & carbohydrate]
- limit fluids to avoid excess dilution of ketones
- kcal/day = 75-100% of recommended....activity level, etc
- protein ≈ 1.0-1.3 g/kg/day to maintain growth in children (~ 5 kcal/kg/d)
- if vitamin/mineral supplements used, check sugar content
- MCT oils (medium chain triglycerides) can facilitate use of ketogenic diet.....MCT's are rapidly absorbed & metabolized for energy: rapid & efficient ketosis



example of ketogenic diet

- 1 yr old child with a weight of 10 kg

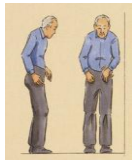
- energy
 - 100 kcal/kg/day = 1000 kcal/day
- 9 : 1 kcal nutrient ratio
 - 10 parts total [1000/10 = 100]
 - 900 kcal fat : 100 kcal prot & carb
 - 5 kcal/kg protein x 10 kg = 50 kcal
 - 1000 kcal - 950 kcal of fat and protein = 50 kcal carb
- 900 kcal fat, 50 kcal protein, 50 kcal carbohydrate
 - = about 13 g prot, 13 g carb, 100 g fat



Parkinson's disease

Some statistics from Parkinson Society of Canada:
 ~100,000 people in Canada have Parkinson's disease
 ~1 in 50 people over age 70 have Parkinson's
 -when diagnosed, about 80% of dopaminergic neurons have already lost normal function

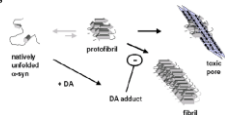
- Onset age is often 50-60 yrs
- Common neurological disease in Canada (neurodegenerative...)
- Progressive loss of neurons (dopaminergic)



- Leads to movement disorders
 - tremors, rigidity, bradykinesia

• Cause(s) of dopaminergic cell loss unknown...some research topics:

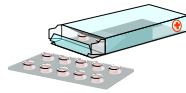
- neurotoxins, mitochondrial dysfunction, oxidative damage...?
 - Does antioxidant deficiency/supplement affect progression?
- misfolding/aggregation of proteins



- Treatment to control symptoms (not cure)
 - L-dopa: crosses blood-brain barrier...converted to dopamine

Drug-nutrient Interactions

- some amino acids (e.g., F, W, I)
 - compete for L-dopa absorption
- high vitamin B6 sources
 - may decrease L-dopa's availability to the brain



Nutritional management of Parkinson's

- Minimize daytime protein (?)
 - e.g., table 41-11
- Advanced Parkinson's:
 - Compromised self-feeding ability

Alzheimer's disease

Some statistics from the Canadian Alzheimer Society:

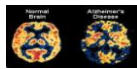
~100,000 cases of dementia diagnosed each year

~450,000 people over age 65 have ARD

'Alzheimer's & Related Dementias'

~1 in 6 over age 75 has ARD

- Degeneration of cortical neurons
- Most common form of dementia
- Causes of dementia?
 - genetic & environmental factors
 - amyloid...



Nutritional consequences of Alzheimer's

- Increased dependency on others for feeding
- Decreased response to thirst, hunger, satiety
- Gradual weight loss is common (weight gain in some)
- Dysphagia
- Abnormal eating behaviour (table 41-7)
 - Food/drink not recognized as such
 - Increased distraction/decreased attention during meals
 - Increased paranoia, anger, violence



Nutritional Recommendations for Alzheimer's

- Nutrient dense foods
- Frequent snacks
- Nutrient supplements...?
 - -Antioxidants ? -Omega-3 ? -Phytochemicals ?...*more evidence needed*
- Frequent nutritional assessments
